

Formulas

$$\text{Midpoint} = \frac{\text{UCL} + \text{LCL}}{2}$$

$$\text{Relative Frequency: } \frac{\text{class frequency}}{\text{sum of all frequencies}}$$

$$\text{Mean: } \bar{x} = \frac{\sum x}{n}, \quad \bar{x}_{FD} = \frac{\sum (f \cdot m)}{n}$$

$$\text{Standard Deviation: } s = \sqrt{\frac{\sum (x^2) - \frac{(\sum x)^2}{n}}{n-1}}, \quad s_{FD} = \sqrt{\frac{\sum (f \cdot m^2) - \frac{[\sum (f \cdot m)]^2}{n}}{n-1}}$$

$$z\text{-score: } z = \frac{x - \bar{x}}{s} \quad \Rightarrow \quad \begin{aligned} x_l &= \bar{x} - zS \\ x_u &= \bar{x} + zS \end{aligned} \quad z\text{---the number of standard deviations from the mean}$$

$$\text{Interval of usual values: } \begin{aligned} x_l &= \bar{x} - 2s \\ x_u &= \bar{x} + 2s \end{aligned} \quad \Rightarrow \quad (x_l, x_u)$$

Median (M): Rank the data from smallest to largest

$$\text{Rank of the Median: } r_M = \frac{N+1}{2}$$

Range: Range = Largest value – Smallest value

Inter-Quartile Range (IQR):

$$\text{Rank of the First Quartile } (Q_1): r_{Q_1} = \frac{r_M + 1}{2}$$

$$\text{Rank of the Third Quartile } (Q_3): r_{Q_3} = \frac{N + r_M}{2}$$

$$IQR = Q_3 - Q_1$$

$$\text{Interval of usual values: } \begin{aligned} x_l &= Q_1 - 1.5 \times IQR \\ x_u &= Q_3 + 1.5 \times IQR \end{aligned} \quad \Rightarrow \quad (x_l, x_u)$$